2000 BIOLOGICAL SURVEY OF LAKE TOOK-A-WHILE

A REPORT ON THE STATUS OF THE WARM WATER SPORT AND FORAGE FISHERIES

By

Brian P. Mangan, Ph.D.
Ecology III, Inc.
Susquehanna SES Environmental Laboratory
RR 1, Box 1795
Berwick, PA 18603

Submitted to

PPL Corporation
Susquehanna Riverlands
RR 1, Box 1797
Berwick, PA 18603

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INTRODUCTION

This report documents the results of a biological survey of Lake Took-a-while (LTAW) performed during April 2000. The purpose of the survey was to assess the current status of the warm water sport and forage fisheries of the lake. This work represents the third phase of a project with the objective of improving the LTAW warm water fishery. Fish and habitat management recommendations are included.

BACKGROUND

Lake Took-a-while is a 24-acre lake constructed in 1979 for recreational fishing associated with the Susquehanna Riverlands. The lake was created by enlarging and connecting two existing ponds and a wetland, which explains its elongated tri-basin appearance. LTAW is approximately 1,300 yards long and ranges in width from about 65 to 340 feet wide. Generally, the water is very shallow, and most areas of the lake are less than 5 feet deep. Maximum depth follows a 30-foot wide channel that extends nearly the length of the lake.

Water flows into LTAW via numerous small inlets located along the western shore (Fig. 1). However, only a few of these feed water to the lake regularly. The volume of the lake is strongly associated with precipitation.

Previous water quality studies have suggested that the lake can support a moderate level of biological productivity (Ichthyological Associates, Inc. 1981). Water quality was not expected to limit fish productivity. However, the low standing crop of phytoplankton and low biomass of benthos, were expected to limit fish production.

Fish of at least 18 species (including trout) have been stocked in the lake since its construction (Ichthyological Associates, Inc. 1984; Ecology III, Inc. 1990). Until recently, catfish have numerically dominated the game fish stockings. The last survey of the fish in the lake, using a 300-ft bag seine to sample, documented some 16 species present at that time (Ecology III, Inc. 1990). Some of these species were not previously stocked, and were thought to have entered the lake from the Susquehanna River during floods.

In the last few years, PA Fish and Boat Commission (PFBC) personnel have been stocking LTAW with trout. Mr. Robert Moase, PFBC Regional Biologist, indicated during a discussion about the lake on 18 January, that the PFBC intended to increase trout stocking in 2000 to about 7,000 fish per year.

Anglers have always exerted a significant amount of pressure on the sport fishery of the lake. This was documented in the past (Ichthyological Associates, Inc. 1981; Ecology III, Inc. 1990), and more recently by an internal PPL Land Management angler survey. With the PFBC's recent expansion of the lake into a trout water, it is expected that the demand on the overall fishery of LTAW will only escalate.

METHODS AND MATERIALS

Three sampling methods were used to assess the sport and forage fisheries. Electrofishing was used to primarily target game species in the lake. Seining and minnow trapping were used to appraise forage fish abundance.

On 4 April, a 5-KW direct current, electrofishing boat with a variable voltage pulsator was used to sample fish. During sampling, the electrofishing boat paralleled

the shoreline of the lake in each of the three basins, and then made a pass down the center of each basin. Fish were identified and enumerated, and many were collected for measurements of length and weight.

Seining of LTAW was done on 6 April. A 25-ft bag seine (0.25-in mesh) was used at three sites (one site per basin). Two seine hauls were made at each site and combined to form one unit of effort. Fish collected by this method were identified and enumerated.

Minnow traps were deployed on 11 April. Five traps were set in each basin for a total of 15 traps. The traps were baited with ground gizzard shad that had been collected during electrofishing, and were checked for trapped fishes on 12 April.

RESULTS

Seven hundred twenty-two fish of at least nine species were collected by electrofishing in the three basins combined (Table1). Bluegill numerically dominated the overall catch, followed by gizzard shad and carp. Together these three species comprised 80% of the fish observed in the lake.

Most of the fish were observed in the center basin, followed by the north and south basins. Bluegill, gizzard shad, and carp dominated the catches in each of these basins as well (ranging from 56% to 92% of the totals). The greatest species diversity was observed in the south basin (9), followed by the north basin (8) and central basin (7).

In general, fish condition was poor. Except for the large carp and relatively few largemouth bass, the size or weight of species such as bluegill and the catfishes

indicated that there was insufficient food for these species. The great majority of bluegills and other sunfishes I observed were less than 4 inches in length and the catfish weights were very low.

The seining effort yielded very poor results. A total of 11 fish (7 bluegills, 2 largemouth bass, 1 rainbow trout, and 1 green sunfish) were captured by seine. No forage fishes were captured. These results clearly indicate the paucity of forage fishes inhabiting LTAW. In addition, I believe these results also reflect the difficult seining conditions now present in the lake, e.g., riprap covering all of the eastern shore and large woody vegetation covering most of the western shore.

The minnow trap results were even worse. No fish were captured in any of the 15 baited traps. Temperature may have been a contributing factor to these results. But temperature did not seem to be a factor in the successful minnow trapping done in the Susquehanna River and its tributaries near LTAW prior to the 11 April effort.

DISCUSSION

Lake Took-a-while exhibits the classic characteristics of a warm water fishery out of balance. Namely, there were numerous stunted sunfishes (prey) and relatively few, but very large bass (predator). Because of the limited biological productivity in LTAW, the smaller fishes like the sunfishes are unable to secure adequate amounts of food and are subsequently stunted. While the bass are large enough to feed on the stunted sunfishes, the sunfish so far outnumber the bass that their numbers cannot be controlled by bass predation.

The forage fishery, an important ecological link in the food chain between producers, primary consumers, and larger fishes, is basically nonexistent. This important population (if a true population has ever existed in LTAW) has likely been decimated through predation. This is probably due to the excessive numbers of potential forage fish predators in the lake, especially with the introduction of thousands of hungry trout each spring. Furthermore, the lack of habitat to act as refugia for forage fishes is also a probable factor in their absence.

The current diversity of species represents only about half of those historically present in the lake. While bluegill, gizzard shad, and carp dominated the electrofishing samples, trout are more abundant during certain times of the year (after spring stockings). From the perspective of a warm water fishery, the preferred species combination in the lake would be predominantly sunfish (bluegill), largemouth bass, and perhaps catfish.

The activity of carp strongly affects LTAW water quality. The reproduction of this species in the spring, and general feeding activity throughout the year, are responsible for much of the suspended sediment in the water column, and consequently, the overall turbid condition of the lake water. Interestingly, despite their vigorous reproduction in the lake, there was no indication of successful recruitment of young carp into older age classes. I believe that this is further evidence of the intense predation pressure on small forage fishes in the lake.

CONCLUSIONS

The limited biological productivity of LTAW and the intense angling pressure on the overall fishery, make it very unlikely that a self-sustaining warm water fishery will be possible without significant intervention. Neither will fish condition improve until food availability is addressed. There are, however, management steps that can be taken to increase the overall productivity of the lake, and greatly encourage the warm water fishery towards PPL management's goal of a "viable family fishery." These recommended steps fall under the general categories of improving water quality, increasing fish habitat, and supplementing fish stocks.

RECOMMENDATIONS

Improving Water Quality

The turbidity of the water of LTAW is sufficient to inhibit biological productivity (photosynthesis), and at times may reach sustained levels that could stress fish. Therefore, steps to decrease the turbidity of the water are advised. The turbidity is primarily the result of suspended sediment, which originated from erosion of stream bank areas along the small inlets that feed water to the lake. During storm events, eroded sediments are carried via these waterways into the lake. This has been the source of considerable sediment loading to the lake, and subsequently, has been a focus of attention among Susquehanna SES pollution control personnel. Once the sediment has entered the lake, it is regularly re-suspended from the substrate by the movement of carp. The re-suspension likely occurs during carp feeding and reproductive activities.

Turbidity from sediments can be treated chemically with additives such as gypsum, lime, and aluminum sulfate. But there are also biological treatments, such as the addition of hay to the water, which may also invigorate the lake's food chain. Decomposing hay forms weak organic acids that help settle clay particles and also stimulates bacterial growth that causes suspended sediments to cluster and settle to the bottom. In addition, the decaying hay helps produce microscopic plants and animals that are important fish foods. Approximately two bales of hay per surface acre of water should be applied in spring or early summer. Oxygen levels must be monitored prior to any application because the decomposition of the hay can significantly lower dissolved oxygen levels.

Taking measures to control the turbidity of LTAW, without controlling the bottom-feeding fishes like carp, would be futile. Therefore, efforts should be made to sharply decrease the carp population in LTAW. A step towards this goal was made on 4 April, when 60 carp were removed from the pond during the electrofishing survey. But more need to be removed. Given the lack of young carp in any of the samples, it seems unlikely that reproduction by a few remaining adults would replenish the population of the pond.

Once turbidity of the lake is decreased, photosynthetic activity within the water column and on lake substrates should increase, thereby increasing productivity of the lake through stimulation of the food chain. This increase in productivity should transfer to small crustaceans and insects, and then to small fish which become the prey of larger fish.

Increasing Fish Habitat

Habitat for fish encompasses all of the necessities for maintaining life and includes factors such as water quality, refuge from predators, spawning sites, and feeding sites. The quality of habitat determines the size and diversity of fish populations that can be maintained in a body of water.

Unfortunately, manmade impoundments such as LTAW often lack the habitat necessary for many of these fish activities. I believe this to be especially true for forage fish habitat, and in particular, habitat needed for spawning and refuge from predators. Addressing the lack of habitat for these fish activities is not difficult and can be accomplished by introducing structure to the lake. This can be done using materials as simple as weighted brush piles or porcupine cribs. Structure like this, will not only serve to increase fish habitat, but will also provide substrate for invertebrates and become fish attractors and assist in the angling of fish.

Supplementing Fish Stocks

LTAW currently lacks the biological productivity necessary to produce healthy populations of warm water game fishes. Some of the recommendations made thus far should begin to address the overall productivity of the lake. However, until productivity is substantially increased, supplemental stocking of fishes will be necessary.

Supplemental stocking can be done in a number of ways. The most straightforward "put and take" practice is to purchase bass, bluegill, and catfish from local hatcheries and introduce them directly to the pond. In light of the strong angling pressure, any stocked fish may be removed before the end of the season (similar to the trout fishery).

There is another approach that would accomplish the same goal and which would perhaps be more cost effective in the long run, while providing some control of the rate of fish harvest. If successful, this approach would also decrease the sole reliance of LTAW warm water fisheries on hatchery stockings. This method would involve using PPL ponds in the vicinity of LTAW. Game fishes, like bass and bluegill, could be stocked in the pond on the former Thomas property. And, forage fishes could be stocked in PPL ponds such as the Waterfowl Pond in the Riverlands Area and the small pond on the former Shortz property off Confer's lane. These ponds can then become sites for rearing fish for eventual transfer to LTAW. While decreasing reliance on hatchery fishes, this approach would also provide greater control over the LTAW fishery by limiting fish availability to anglers.

SUMMARY

Establishing a "viable family fishery" of warm water game fishes in Lake Took-a-while is an achievable goal that can be accomplished with a modest investment of time and resources. Action should be taken to encourage the productivity of the lake while decreasing the turbidity of the water. The addition of hay to the water should begin to address both of these issues. Habitat improvements should be made to provide refugia and spawning surfaces for forage species. Supplemental stockings of fish will be necessary to achieve the warm water fishery goal. However, there exists a more creative alternative to the simple "put and take" of hatchery fish to the lake, and involves using other PPL ponds in the vicinity of LTAW. This alternative could prove cost-effective in the long term and provide some control to fish harvested from LTAW.

Implementation of these recommendations will provide a significant step towards the realization of a viable family fishery in Lake Took-a-while. As always, Ecology III personnel are ready to assist in any and all aspects of helping PPL achieve their lake management objectives.

REFERENCES

Ecology III, Inc. 1990. An environmental study of Lake Took-a-while with an evaluation of its sport fishery, 1983-88 report. Prepared for PA Power & Light Co. January 1990.

Ichthyological Associates, Inc. 1981. An ecological study of Lake Took-a-while with an evaluation of its sport fishery. Prepared for PA Power & Light Co., November 1981.

Ichthyological Associates, Inc. 1984. An ecological study of Lake Took-a-while with an evaluation of its sport fishery, 1982 report. Prepared for PA Power & Light Co. February 1984.

Table 1

Fishes collected by electrofishing in Lake Took-a-while on 6 April 2000.

SPECIES	BASIN			TOTAL
	North	Center	South	
Gizzard shad	56	108	9	173
Carp	17	33	21	71
Yellow bullhead	1	0	3	4
Channel catfish	1	1	1	3
Muskellunge[a]	0	0	1	1
Rainbow trout	15	3	7	25
Bluegill	43	176	114	333
Largemouth bass	12	12	7	31
White crappie	3	1	2	6
Sunfish spp.	35	3	2	40
Unidentified	24	7	4	35
Totals`	207	344	171	722

[a] Unknown if purebred or hybrid.

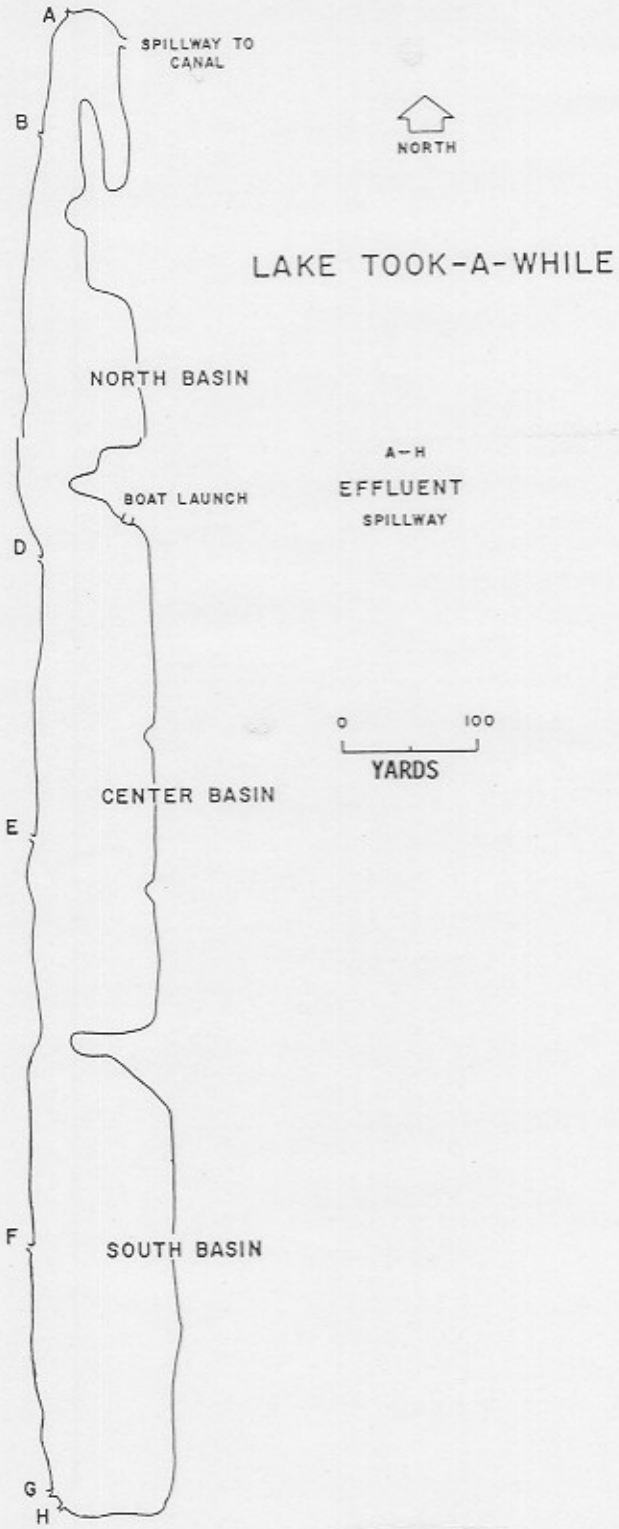

Fig. 1

Inlet sites at Lake Took-a-while.